CLAIMS

What is claimed is:

1. A computer-implemented method for processing video data comprising:

determining an ideal playback timing associated with the video data; and

if an actual playback timing of the video data lags the ideal playback timing, varying a frame rate associated with the video data using a smoothing function to recover toward the ideal playback timing.

2. The computer-implemented method as recited in Claim 1, wherein smoothly varying the frame rate includes controlling the frame rate using a frame-dropping algorithm that drops frames in the video data in accordance with the smoothing function.

3. The computer-implemented method as recited in Claim 2, wherein controlling the frame rate includes:

computing a delay by comparing the actual playback timing with the ideal playback timing; and

if the delay exceeds a threshold value, determining that the actual playback timing lags the ideal playback timing.

4. The computer-implemented method as recited in Claim 3, wherein the threshold value accounts for ordinary system variations.

5. The computer-implemented method as recited in Claim 3, wherein the delay is computed by subtracting the ideal playback timing from the actual playback timing.

6. The computer-implemented method as recited in Claim 3, wherein the smoothing function incorporates the delay as a variable.

7. The computer-implemented method as recited in Claim 3, wherein the delay is computed as an average delay that includes an average of the delay associated with a current frame of the video data and at least a delay associated with a previous frame.

8. The computer-implemented method as recited in Claim 7, wherein the average delay is an average of delays associated with the current frame and a plurality of previous frames.

9. The computer-implemented method as recited in Claim 2, wherein the frame-dropping algorithm includes a rasterization algorithm.

10. The computer-implemented method as recited in Claim 2, wherein the frame-dropping algorithm includes if a current frame is a B-frame, dropping the current frame.

11. The computer-implemented method as recited in Claim 2, wherein the frame-dropping algorithm includes if a current frame is an I-frame, showing the current frame without further determination.

12. The computer-implemented method as recited in Claim 2, wherein the frame-dropping algorithm includes if a current frame is a P-frame, processing the current frame to obtain enough information for processing subsequent frames before dropping the current frame.

13. The computer-implemented method as recited in Claim 2, wherein the frame-dropping algorithm includes if the actual playback timing does not lag the ideal playback timing, overriding any determination to drop frames.

14. The computer-implemented method as recited in Claim 1, wherein the ideal playback timing is determined from a presentation clock.

15. The computer-implemented method as recited in Claim 14, wherein the presentation clock includes a filter configured to remove noise.

16. One or more computer-readable memories containing a computer program that is executable by a processor to perform the computer-implemented method recited in Claim 1.

17. A computer-implemented method for managing video data frame rates comprising:

determining delays associated with playback of frames of video data;

calculating an average delay from averaging the delays;

determining an ideal frame rate associated with the frames;

calculating a frame skip factor; and

varying the frame rates associated with the playback by applying a frame-dropping algorithm configured to determine whether to drop a current frame using the frame skip factor.

18. The computer-implemented method as recited in Claim 17, wherein the frame skip factor is calculated with a tolerance factor that accounts for variability in a system timer.

19. The computer-implemented method as recited in Claim 17, wherein the frame-dropping algorithm includes an iterative algorithm that varies the frame rates using a smoothing function that includes the frame skip factor.

20. The computer-implemented method as recited in Claim 17, wherein the frame-dropping algorithm includes:

if the frame skip factor is greater than the ideal frame rate, adding the ideal frame rate to an iterator; and

if the iterator is greater than or equal to the frame skip factor, subtracting the frame skip factor from the iterator and showing the current frame.

21. The computer-implemented method as recited in Claim 20, wherein the frame-dropping algorithm includes if the iterator is less than the frame skip factor, dropping the current frame.

22. The computer-implemented method as recited in Claim 21, wherein the frame-dropping algorithm includes:

if the iterator is less than the frame skip factor, determining whether the average delay has reached a significant percentage of a maximum delay; and

if so, showing the next I-frame subsequent to the current frame.

23. The computer-implemented method as recited in Claim 17, wherein priority is given to the execution of the computer-implemented method to improve the quality associated with the calculated frame rates.

24. One or more computer-readable memories containing a computer program that is executable by a processor to perform the method recited in Claim 17.

25. An apparatus comprising:

means for determining an ideal playback timing associated with the video data; and

means for varying a frame rate associated with the video data using a smoothing function to recover toward the ideal playback timing.

26. The apparatus as recited in Claim 25, further comprising means for controlling the frame rate using a frame-dropping algorithm that drops frames in the video data in accordance with a smoothing function.

27. The apparatus as recited in Claim 26, further comprising means for buffering the video data so that the frame-dropping algorithm is executing ahead of real time.

28. The apparatus as recited in Claim 26, further comprising means for incorporating a rasterization algorithm into the frame-dropping algorithm.

29. The apparatus as recited in Claim 25, further comprising:

means for computing a delay by comparing an actual playback timing with the ideal playback timing; and

means for incorporating the delay into the smoothing function.

29. The apparatus as recited in Claim 25, further comprising:

means for computing an average delay associated with playback of a plurality of frames; and

means for incorporating the average delay into the smoothing function.

30. One or more computer-readable media having stored thereon a computer program that, when executed by one or more processors, causes the one or more processors to:

determine an ideal playback timing associated with video data; and

if an actual playback timing of the video data lags the ideal playback timing, vary a frame rate associated with the video data using a smoothing function to recover toward the ideal playback timing.

31. One or more computer-readable media as recited in Claim 30, wherein the frame rate is smoothly varied by applying a frame-dropping algorithm that drops frames in the video data in accordance with the smoothing function.

32. One or more computer-readable media as recited in Claim 31, wherein the frame-dropping algorithm includes:

computing an average delay by averaging delays associated with frames in the video data, and

incorporating the average delay into the smoothing function.

33. An electronic device comprising:

a memory; and

a processor coupled to the memory, the processor being configured to

determine an ideal playback timing associated with video data; and

if an actual playback timing of the video data lags the ideal playback timing, vary a frame rate associated with the video data using a smoothing function to recover toward the ideal playback timing.

34. The electronic device as recited in Claim 33, wherein the processor being further configured to apply a frame-dropping algorithm that drops frames in the video data in accordance with the smoothing function.

35. The electronic device as recited in Claim 33, wherein the processor being further configured to compute an average delay by averaging delays associated with frames in the video data and incorporate the average delay into the smoothing function.